

WHAT IS CLAIMED IS:

1. An anastomosis staple device for connecting a free end of a graft vessel to a wall of a target vessel such that a lumen in the graft vessel is in fluid communication with a lumen in the target vessel through an opening in the wall of the target vessel, the anastomosis staple device comprising:

an anchor member, said anchor member having means for attaching said anchor member to said wall of said target vessel,

a coupling member, said coupling member being configured to attach said free end of said graft vessel to said coupling member, and

a coupling means for attaching said coupling member to said anchor member such that said end of said graft vessel is sealingly connected to said wall of said target vessel and said lumen of said graft vessel is in fluid communication with said lumen of said target vessel through said opening in said wall of said target vessel.

2. An anastomosis fitting for connecting a free end of a graft vessel to a wall of a target vessel such that a lumen in the graft vessel is in fluid communication with a lumen in the target vessel through an opening in the wall of the target vessel, the anastomosis fitting comprising:

an inner flange, said inner flange having a proximal surface and a distal surface and a central orifice of sufficient size to accommodate an external diameter of said graft vessel, said inner flange providing an atraumatic attachment for said end of said graft vessel when said end of said graft vessel is passed through said central orifice and everted over said inner flange, said inner flange being insertable through said opening in said wall of said target vessel,

an outer flange, said outer flange having a proximal surface and a distal surface and a central orifice of sufficient size to accommodate the external diameter of said graft vessel, said distal surface of said outer flange being configured to

contact an exterior surface of said wall of said target vessel proximate said opening,  
and

means for maintaining said outer flange in a selected position with respect to  
said inner flange such that said everted end of said graft vessel is sealingly  
5 connected to said wall of said target vessel and said lumen of said graft vessel is in  
fluid communication with said lumen of said target vessel through said opening in  
said wall of said target vessel.

3. The anastomosis fitting of claim 2, wherein said inner flange is  
10 configured such that the everted end of said graft vessel substantially covers at least  
said distal surface of said inner flange such that said inner flange is fluidly isolated  
from said lumen of said target vessel and said lumen of said graft vessel

4. The anastomosis fitting of claim 2, further comprising a tubular body  
15 having a  
proximal end and a distal end, said inner flange being connected to said distal end,  
said tubular  
body having a central lumen of sufficient size to accommodate an external diameter  
of said graft vessel.

5. The anastomosis fitting of claim 4 wherein a proximal portion of said  
20 tubular body is configured to be slidably received in said central orifice of said outer  
flange, and said means for maintaining said outer flange in a selected position with  
respect to said inner flange comprises a locking means for locking said outer flange  
25 to said tubular body.

6. The anastomosis fitting of claim 5 wherein said locking means comprises a self- locking retaining washer slidably positioned on an exterior surface of said tubular body.

5 7. The anastomosis fitting of claim 3 wherein said outer flange is deformable from an initial configuration wherein said distal surface of said outer flange does not contact said exterior surface of said wall of said target vessel to a deployed configuration wherein said distal surface of said outer flange contacts said exterior surface of said wall of said target vessel.

10 8. The anastomosis fitting of claim 2 wherein said means for maintaining said outer flange in a selected position with respect to said inner flange comprises a deformable means for connecting said outer flange to said inner flange, whereby said deformable means can be deformed to position and hold said outer  
15 flange in a selected position with respect to said inner flange.

9. The anastomosis fitting of claim 2 wherein said outer flange is divided into a plurality of flange sectors, each of said flange sectors being connected to said inner flange by way of at least one deformable means.

20 10. The anastomosis fitting of claim 9 wherein said deformable means is connected to said inner flange by way of a tubular body, said tubular body having a central lumen of sufficient size to accommodate an external diameter of said graft vessel.

25 11. The anastomosis fitting of claim 2 wherein said outer flange comprises a tubular body connected to said inner flange, said tubular body being deformable from an undeformed configuration to an expanded configuration to form said outer flange.

12. The anastomosis fitting of claim 11 wherein said tubular body is divided into a plurality of longitudinal segments, said longitudinal segments being predisposed to expand outward when compressed axially.

5 13. The anastomosis fitting of claim 2, wherein said inner flange has at least two operative positions, including:

a collapsed position wherein said inner flange has a collapsed diameter, and  
an expanded position wherein said inner flange has an expanded diameter  
which is greater than said collapsed diameter.

10 14. The anastomosis fitting of claim 13, wherein said inner flange comprises a plurality of flange sectors, said flange sectors being collapsed toward one another to occupy a diameter equal to said collapsed diameter when said inner flange is in said collapsed position and said flange sectors being expandable away  
15 from one another to occupy a diameter equal to said expanded diameter when said inner flange is in said expanded position.

20 15. The anastomosis fitting of claim 14, further comprising an expansion means for expanding said inner flange from said collapsed position to said expanded position.

25 16. The anastomosis fitting of claim 15, wherein said expansion means comprises a tubular member which, when inserted into said central orifice between said flange sectors, forces said flange sectors from said collapsed position to said expanded position.

17. The anastomosis fitting of claim 2, wherein said inner flange comprises a plurality of initially longitudinally oriented segments, said segments being configured to expand radially in response to being compressed axially.

18. The anastomosis fitting of claim 17, wherein said initially longitudinally oriented segments have a proximal end which is connected to said outer flange and a distal end, said segments being configured to expand radially when said distal end is compressed axially toward said proximal end.

19. The anastomosis fitting of claim 18, wherein said segments have a curved portion intermediate said proximal end and said distal end predisposing said segments to expand radially when said distal end is compressed axially toward said proximal end.

20. A method of performing an anastomosis to connect a free end of a graft vessel to a wall of a target vessel such that a lumen in the graft vessel is in fluid communication with a lumen in the target vessel through an opening in the wall of the target vessel, the method comprising:

attaching said free end of said graft vessel to an inner flange of an anastomotic fitting; inserting said inner flange with said free end of said graft vessel attached through said opening in said wall of said target vessel and engaging an inner surface of said target vessel with said inner flange;

positioning an outer flange of said anastomotic fitting in contact with an exterior surface of said wall of said target vessel proximate said opening; and

coupling said inner flange and said outer flange such that said graft vessel is sealingly connected to said wall of said target vessel and said lumen of said graft vessel is in fluid communication with said lumen of said target vessel through said opening in said wall of said target vessel.